

being completely coated. Prepared specimens show the stippled margin noted in typical examples of the variety. All the specimens are broadly oval, narrowed at anterior extremity. Length varying from 6 to 8.50 mm., and breadth from 5 to 7 mm.

LI.—*Five new Rhinolophi from Africa.*

By KNUD ANDERSEN.

IN working out a revision of the Ethiopian species of the genus *Rhinolophus* I find the following new forms in the collection of the British Museum to need description:—

Rhinolophus empusa, sp. n.

Short diagnosis.—Anterior upper and middle lower pre-molars placed in the tooth-row. Sella wedge-shaped (deltoid). Horseshoe as broad as muzzle. A conspicuous dark patch under each eye. Forearm 48 mm.

Nose-leaves.—Horseshoe covering the muzzle laterally; a small tooth-like projection on each side of median notch; underlying leaf easily visible all round. Sella wedge-shaped; breadth at base about three fourths of vertical height; lateral margins plainly converging (with a scarcely perceptible constriction in the middle) towards the summit, which is subacutely pointed. Posterior connecting-process long, pointed, slightly curved forwards, as an erect horn, about five sixths the vertical height of the sella, thus projecting far beyond the summit of the sella. Lateral margins of lancet concave in the middle, tip behind constriction about 2.3 mm.

Ears.—Rather short, scarcely reaching tip of muzzle, when pressed forwards along the sides of the head. Tip obtusely pointed. Outer margin concave below the tip. Notch on outer margin shallow, almost rectangular. Extreme breadth of ear somewhat greater than the distance from the notch to the tip.

Wings.—5th metacarpal longer than 4th. 1st joint of 4th finger equal to three fifths the length of 1st joint of 3rd finger. On the folded wing the tip of the 1st joint of the 5th finger reaches as far back as the posterior point of the elbow; tip of 1st joint of the 3rd finger falling only a trifle short of the same point. Plagiopatagium inserted at base of metatarsus.

Tail.—Much longer than tibia, about the same length as the combined 1st and 2nd joints of the 4th finger. Tip of tail projecting 2 mm. beyond the membrane (a character

which, however, no doubt will prove to be subject to a certain amount of individual variation). Hinder border of interfemoral, between tips of calcars, almost square.

Colour (of spirit-specimen).—Light brown above, greyish beneath. Sides of face yellowish white, with a strongly marked dark brown patch under each eye. Membranes dark brown; free margin of plagiopatagium very narrowly bordered with whitish. Forearm, metacarpals, and finger-joints yellowish.

Skull.—Essential characters as in *Rh. Blasii*, but parietal region of skull still more globular; frontal region considerably less constricted. Extreme width of brain-case slightly greater than zygomatic width. Median anterior point of palatal bridge opposite front of m^1 ; median posterior point drawn out into a tooth-like projection. Upper margin of mandible from condyle to base of coronoid process almost straight. Coronoid process very small, projecting only a trifle beyond the highest cusp of m_1 .

Dentition.—Small anterior upper premolar (p^2) placed in the tooth-row. Upper canine and posterior premolar (p^4) widely separated. Cusp of p^4 three fourths the height of the canine. Middle lower premolar (p_3) extremely small, but placed entirely in the tooth-row, separating p_2 and p_4 from each other; p_2 one third the height of the canine. Cusp of lower p_4 not quite as high as the antero-exterior cusp of m_1 .

Type.—♀ ad. Zomba, Nyasa, collected by Mr. A. Whyte, Jan. 1893, presented by Sir Harry Johnston. B.M. no. 93.7.9.33.

Distribution.—Only one specimen, the type, examined.

Remarks.—(This fine species stands quite alone among the African *Rhinolophi*, being the only hitherto known species with a wedge-formed sella.) Its nearest ally is the South European *Rh. Blasii*. In dentition *Rh. empusa* occupies a slightly more primitive position than *Rh. Blasii*: in the former the lower p_3 is still entirely in the tooth-row, in the latter it is just on the point of being driven out on the exterior side of the tooth-row.

Measurements of the type.

Nose-leaves:	mm.
Front of horseshoe to posterior point of lancet	13·8
Extreme width of horseshoe	9
Vertical height of sella	3·1
Width of sella at base	2·3
Ears:	
Base of lower margin to tip	15·2
Notch on outer margin to tip	11·8
Extreme width	13·2

Wings :	mm.
Forearm	48
3rd finger, metacarpal	30.8
" 1st joint	15.7
" 2nd joint	24
4th finger, metacarpal	33.7
" 1st joint	9
" 2nd joint	15
5th finger, metacarpal	35
" 1st joint	11
" 2nd joint	12
Tail, from anus	25.3
Tibia	20.2
Hind foot (c. u.)	9.8
Skull :	
Extreme length	19.8
Basal length	15.2
Extreme width of brain-case	9.3
Zygomatic width	9
Maxillar width, across outer margin of m^3	6.1
Orbital constriction	2.8
Palatal bridge	2.6
Med. post. point of palate to front of premaxilla ..	6.2
" " " " " for. magnum	9
Mandible, " condyle " to front of incisors	13.1
Teeth :	
Front of upper canine to back of m^3	6.5
Front of lower canine to back of m_3	6.8

Rhinolophus augur, sp. n.

Short diagnosis.—(Apparently allied to *Rh. ferrum-equinum*, but readily distinguished by its much smaller ears and shorter tail. Forearm 54–57 mm.)

Nose-leaves.—Horseshoe not covering muzzle laterally. Sella pandurate, as in *Rh. ferrum-equinum*, but decidedly narrower. Posterior connecting-process triangular, obtusely pointed, its upper margin straight, shorter than the vertical height of sella. Lateral margins of lancet deeply emarginate.

Ears.—Not reaching tip of the muzzle, when laid forward. Tip attenuated and acutely pointed. Outer margin strongly concave below the tip of the ear. Greatest width of ear equal to its length from notch on outer margin to tip.

Wings.—General characters as in *Rh. ferrum-equinum*, but forearm on the average shorter, its *maximum* length (57.2 mm. in a series of 15 specimens) being almost exactly like mean measurements in *Rh. ferrum-equinum* (57 mm., 31 specimens from Europe). 5th metacarpal slightly longer than 4th. 2nd joint of 3rd finger almost twice the length of 2nd joint of 5th finger. In the folded wing, tip of 1st joint of 3rd and 5th fingers opposite posterior point of elbow. Plagiopatagium inserted at the tarsal joint.

Tail.—Much shorter than in *Rh. ferrum-equinum*, its length (31.3 mm. on average) being almost exactly the same as the 2nd joint of 3rd finger (30.7 mm.); in *Rh. ferrum-equinum* much longer (36.7 against 29.5 mm.). Hinder border of interfemoral, between tip of calcars, slightly triangular.

Colour (16 skins).—General colour above “drab,” with a tinge of fawn. Individual hairs “ecru-drab” at base, drab at tip. On the middle of the back an ill-defined (in some individuals scarcely perceptible) horseshoe-shaped patch, approaching “wood-brown”; branches of this patch on the shoulder-region, convexity backwards. Length of hairs on middle of back about 7.5 mm. Underside bright ecru-drab, more or less tinged with vinaceous buff on the breast and sides of the body. Ears (dried) transparent brown, membranes dark brown. Adult individuals vary but very slightly in colour, some being more greyish, others more fawn in hue. Young specimens (5 skins) are much duller coloured; fur above greyish brown; horseshoe-patch on back indicated, but rather indistinct; below bright grey, with a slight rosy tinge.

Dentition.—Essentially as in *Rh. ferrum-equinum*. Upper c and p^4 closely approximated, their cingula actually touching each other or separated only by an almost hair-fine interspace. Upper p^2 minute, blunt, placed in the outer angle formed by c and p^4 , hardly rising to the level of the cingulum of the canine; this small tooth is present in all of the fourteen skulls examined, but will no doubt be found wanting in very old individuals with much-worn teeth (cf. *Rh. augur zambesienensis*). Upper p^4 as high as two thirds of the canine. Lower p_2 one third of p_4 . Lower p_3 , when present, extremely small, placed on the external side of the tooth-row, blunt, as high as the cingulum of p_4 ; in nine out of fourteen skulls examined this tooth is wanting, and every trace of the alveole has disappeared; in a tenth specimen (adult) the tooth is wanting on both sides, but the left alveolus is still to be traced: in the remaining four skulls p_2 is present on both sides; three of these latter are skulls of *young* bats, the fourth of an apparently adult individual, though still with almost unworn teeth. As proved by these facts, the presence or absence of p_3 in this species varies *individually*, without any bearing on differences in geographical distribution: of six specimens from the same cave, taken by the same collector and in the same season of the year, two have lost both the tooth and every trace of the alveolus, while in four specimens it is present on both sides; evidently it is most often to be found

in *young* individuals, more rarely in full-grown, perhaps never in very old. Lower p_4 a little higher than antero-exterior cusp of m_1 .

Measurements.—Below under *Rh. augur zambesiensis*.

Type.—♂ ad. (skin). Kuruman, Bechuanaland, 4000 feet, collected by Mr. R. B. Woosnam, April 19th, 1904. B.M. no. 4. 10. 1. 1. Original no. 26. "Caught in an old mine; of fifteen taken there was only one female."

Distribution.—Specimens have been examined from the following localities:—Zuurbron, Wakkerstrom, S. Transvaal (1 specimen in alcohol); De Kaap, S. Transvaal (2, alcohol); near Krügersdorp, S. Transvaal, 4900 feet (6 skins); "Transvaal" (1, alcohol); Vredefort Road, N. Orange River Colony (1, alcohol; 2 skins); Kuruman, Bechuanaland, 4000 feet (8 skins). It will probably be found generally distributed over the whole of that part of South Africa which is irrigated by the Orange River and its confluent ("Orange River Area," in the zoogeographical sense of that term).

Remarks.—The present species has been confused with *Rh. ferrum-equinum* and *Rh. capensis* to such extent that it will be difficult to disentangle its synonymy without examination of the specimens recorded in literature. *Rh. capensis* differs mainly in the following points:—It is much smaller: forearm 49·5 mm. (average of eleven specimens), against 56 in *Rh. augur*; the ears much longer (20·5 mm. from base of inner border) and broader (16·7 mm.); tip of the ear obtusely pointed; sella only very slightly narrowed in the middle, its lateral margins subparallel in their upper half; posterior connecting-process shorter, its upper margin concave; all metacarpals and finger-joints much shorter, therefore the wing very much narrower in antero-posterior direction; even a badly prepared skin of *Rh. capensis*, in which the shape of the ears and nose-leaves is unrecognizable and the length of the tail not to be relied upon, can *always* be at once distinguished from *Rh. augur* by taking the measurement of the 2nd joint of the 3rd finger (22–26 mm., against 28·7–32 in *Rh. augur*); the tail remarkably short (20·8 mm.), only about the same length as the tibia, far shorter than the 2nd joint of 3rd finger, &c. The skull of *Rh. capensis* is slightly smaller; the nasals more swollen; the auditory bullæ larger; the basioccipital therefore still narrower; the tympanic ring larger. As far as the available material goes, *Rh. capensis* seems to be restricted to the *western part of the Cape Colony*, as far north as the mountains on which the coast-rivers spring, eastwards to Winter-Bergen.

Rh. augur bears, in fact, much more resemblance to *Rh. ferrum-equinum*. The differences between the two species have already been pointed out above. Whether, however, this resemblance is indicative of true relationship, or rather of convergence owing to similar habits and similar effects of natural surroundings, is open to question. It is in this connexion worth while mentioning that no doubt all the previous records of the occurrence of *Rh. ferrum-equinum* in Africa south of the Mediterranean subregion rest on confusion with other species; that, consequently, the two species, at the present time at least, are separated from each other by almost the whole of the tropical region of Africa.

Rhinolophus augur zuluensis, subsp. n.

Short diagnosis.—(A small and darker-coloured race of *Rh. augur*. Forearm 51·2–54·5 mm.)

Colour (8 skins).—Fur above approaching "wood-brown." Horseshoe-patch on back nearest to "russet." Beneath light "drab," tinged with pinkish buff on the sides of the body.

Measurements.—See table under *Rh. augur zambsiensis*.

Type.—♀ ad. (skin). Jususic Valley, 20 miles N.W. of Eshowe, Zululand, 1000 feet, collected by Mr. C. H. B. Grant, Nov. 17th, 1903, presented by C. D. Rudd, Esq. B.M. no. 4. 5. 1. 8. Original no. 602. "Caught in old gold-driving."

Distribution.—Specimens examined:—King William's Town (1, in alcohol); Port Natal (1, alcohol); typical locality (8 skins). This race will probably be found generally distributed over the whole of the Natalese Province, southwards to Winter-Bergen, northwards to about the latitude of Delagoa Bay, westwards to the mountain-range in which the coast-rivers rise.

Remarks.—The obvious difference in size and colour, combined with the distinct geographical distribution, entitle this form to subspecific rank. It cannot be confounded with young individuals of the typical form: young *Rh. augur* are greyish brown above, bright grey with a slight rosy tinge beneath; *Rh. a. zuluensis*, owing to a stronger development of the darker-coloured tips of the hairs, next to wood-brown above, light drab beneath.

Rhinolophus augur zambsiensis, subsp. n.

Short diagnosis.—(Very dark-coloured. In size somewhat intermediate between *Rh. augur* and *Rh. a. zuluensis*. Forearm 53·3–54·8 mm.)

Colour (1 skin).—In the two forms just described the more or less distinct dark zone on the back takes the form of a horseshoe-patch. In the present race this patch extends over the whole of the back, giving the upperside of the animal an almost uniform brown colour, approaching "mummy-brown." Underside light "drab," somewhat darker in shade than in *Rh. a. zuluensis*. Ears and membranes (dried) black; in spirit-specimens the ears are "raw umber," the wings blackish brown.

Dentition.—The only skull examined is of a very old individual with much-worn teeth; both upper p^2 and lower p_3 are wanting, and no trace of their alveoli is to be seen. In younger individuals the dentition will no doubt be found to agree with that of the other races.

Type.—♂ ad. (skin). Fort Hill, N. Nyasa, about $9^\circ 40' S.$, $33^\circ 20' E.$, collected by Mr. A. Whyte, July 1896, presented by Sir Harry Johnston. B.M. no. 97.10.1.18. Original no. 136.

Distribution.—Specimens examined:—Mazoe, Mashonaland, $17^\circ 30' S.$, $23^\circ 30' E.$ (3, in alcohol); Zomba, Nyasa, $15^\circ 30' S.$, $35^\circ 30' E.$ (1, alcohol); and the type.—From these localities it may be supposed that the present form is generally distributed over the whole of the area which is irrigated by the Zambesi and its confluent.

Remarks.—As will be seen from the above, the three forms of *Rh. augur* just described are characteristic of three distinct zoogeographical districts of S. Africa:—*Rh. augur* of the Orange River District (in wider sense); *Rh. a. zuluensis* and *zambesiensis* of the areas from which I have derived their names*.

Rhinolophus simulator, sp. n.

Short diagnosis.—(Small upper premolar separating the canine and posterior premolar. In outer aspect somewhat like a peculiarly small and long-tailed *Rh. capensis*. Forearm 43.5–45 mm.)

Nose-leaves.—Horseshoe as in *Rh. capensis*; underlying leaf distinct, under the margin of the horseshoe. Sella longer (higher) and slightly broader than in *Rh. capensis*; constriction below the middle very shallow; lateral margins subparallel in their upper half; summit broadly rounded off; width at summit equal to half the vertical height of sella.

* I am very glad to see these facts in perfect accordance with the zoogeographical subdivision of this part of S. Africa as proposed, five years ago, by Professor Matschie in his admirable book 'Die Megachiropteren des Berliner Museums für Naturkunde' (Berlin, 1899, p. 40).

Measurements of *Rh. augur* and subspecies.

	<i>Rh. augur.</i>		<i>Rh. a. zuluensis.</i>		<i>Rh. a. zambezensis.</i>	
	Type.	Average of 15 spems.	Type.	Average of 8 spems.	Type.	Average of 5 spems.
	mm.	mm.	mm.	mm.	mm.	mm.
Nose-leaves:						
Front of horseshoe to posterior point of lancet..	..	13.3	..	13.1	..	13.4
Extreme width of horseshoe .....	..	7.9	..	7.6	..	8.3
Ears:						
Base of inner margin to tip.	..	18.8	..	18	..	18.6
Notch on outer margin to tip .....	..	14.4	..	13.8	..	13.2
Extreme width .....	..	14.6	..	14.3	..	14.5
Wings:						
Forearm	55.8	55.9	52	52.6	53.3	54
3rd finger, metacarpal	36	36.8	34.5	34.8	32	34.6
" 1st joint	18.1	18.4	17.8	17.5	18.1	18.1
" 2nd joint	31	30.7	27	28.3	28.8	29.2
4th finger, metacarpal	39	40.4	38.3	38	38.7	39.1
" 1st joint	11.4	11.6	11.3	11.3	11.8	11.2
" 2nd joint.	19	18.9	17	17.4	19.8	19
5th finger, metacarpal	41.5	41.3	39.4	39	39.7	40.1
" 1st joint	13.9	13.9	12.8	13.1	14.8	13.5
" 2nd joint	15.5	15.7	14.1	14.7	16.2	15.9
Tail, from ¹ mus .....	..	31.3	..	29	..	32.5
Tibia .....	..	23.6	..	22.3	..	23.4
Skull:						
Extreme length	22.8	22.7	22.1	22.4	22.7	
Basal length	18.3	18.4	17.8	18	18.1	
Extreme width of braincase	10.2	10.2	10	10.1	10	
Zygomatic width	11.9	11.8	11.7	11.7	11.7	
Width across outer margins of m^3	8.8	8.5	8.2	8.2	8.2	
Orbital constriction	2.9	2.7	2.8	2.8	2.8	
Palatal bridge	2.2	2.2	2.2	2.2	2.3	
Med. post. point of palate to front of premaxilla.	7.2	7.1	7	7	7	
Med. post. point of palate to for. magnum	11.1	11.3	10.8	11	11.1	
Mandible, condyle to front of incisors	15.2	15.3	14.7	15	15	
Teeth:						
Front of upper canine to back of m^3	8.8	8.4	8.1	8.2	8	
Front of lower canine to back of m_3	9.2	9	8.8	8.9	8.8	

Posterior connecting-process very short, rounded off above, scarcely projecting beyond the summit of sella (this kept in vertical position). Margins of lancet abruptly narrowed; tip of lancet behind constriction with slightly converging (nearly parallel) margins, about 2 mm. in length.

Ears.—Large; reaching far beyond the tip of the muzzle, when placed along the sides of the head. Tip of ears obtusely pointed, as in *Rh. capensis*. Outer margin strongly concave below tip. Notch on outer margin shallow, obtuse. Extreme width of ear somewhat greater than the distance from notch to tip.

Wings.—General form as in *Rh. capensis*, but all dimensions markedly smaller. 4th metacarpal slightly longer than 5th. In the folded wing the tip of the 1st joint of 4th finger reaches very nearly the posterior point of the elbow; tip of 1st joints of 3rd and 5th fingers slightly beyond. Plagiopatagium inserted at basal joint.

Tail.—Considerably longer than in *Rh. capensis*, uropatagium therefore much broader. Hinder margin of uropatagium, between tips of calcars, square (concave in *Rh. capensis*, on account of the shorter tail). Tip of tail projecting about 1 mm.

Colour (1 skin).—Exactly as in *Rh. augur*. Length of hairs on middle of back about 8 mm. Young individuals (1 skin) considerably duller than adult ones; details exactly as in *Rh. augur*, juv.

Skull.—Very different from that of *Rh. capensis*:—Much smaller. Nasal swellings unusually prominent; nasal region deeply hollowed out behind swellings; for both these reasons the facial portion of the skull, from the swellings to crista sagittalis, more concave than in *Rh. capensis*. Palatal bridge much broader: median anterior point opposite front of m^1 , in *Rh. capensis* opposite middle of the same molar.

Dentition.—Widely different from that of *Rh. capensis*:—Distance between tips of upper canines 3.8 mm., in *Rh. capensis* 5 mm. Upper canine and p^4 distinctly separated from each other, also internally; distance between tips of these teeth 2.1 mm.; in *Rh. capensis*, although the skull is much larger, 1.9 mm. Upper p^2 placed in the tooth-row, with a minute cusp distinctly projecting above the cingulum of canine. Highest cusp of p^4 somewhat more than half the height of canine. Inner lobes of molars less developed than in *Rh. capensis*: m^2 as long as broad, in *Rh. capensis* decidedly broader than long. Right p_3 extremely minute, in the outer angle formed by the cingula of p_2 and p_4 ;

cingula of these latter in immediate contact internally; left p_3 wanting, without any trace of the alveolus.

Type.—♂ ad. (in alcohol). Mazoe, Mashonaland, collected by J. ff. Darling, Esq. B.M. no. 2. 2. 7. 10.

Distribution.—Besides the type specimen I have seen only two skins, from the same locality and the same collector.

Remarks.—Owing to our still very defective knowledge of the Ethiopian *Rhinolophi*, the true affinities of this interesting species are somewhat obscure. I have compared it with *Rh. capensis*, only because it, by quite superficial inspection, could be taken for a curiously small and long-tailed form of that species. The totally different skull and dentition prove that it, in fact, has nothing to do with *Rh. capensis*, but, most probably, is to be regarded as an aberrant member of the *Rh. Landeri* group. It cannot be confounded with any other species; *Rh. Landeri*, *lobatus*, and *Denti* may, apart from many other differences, at once be distinguished by their very narrow sella.

Measurements.

	♂ ad., type. mm.	♂ ad., typical locality. mm.
Nose-leaves:		
Front of horseshoe to posterior point of lancet	13.7	
Extreme width of horseshoe	8.3	
Width of sella at base	2.4	
" " summit	2.2	
Ears:		
Base of inner margin to tip	20	
Notch on outer margin to tip	13.2	
Extreme width	14.5	
Wings:		
Forearm	43.5	45
3rd finger, metacarpal	30	30.8
" 1st joint	13.6	14.5
" 2nd joint	22.9	22.8
4th finger, metacarpal	33.2	34
" 1st joint	8.1	8
" 2nd joint	14.8	13
5th finger, metacarpal	32.2	33.3
" 1st joint	10.7	10.5
" 2nd joint	12.5	12
Tail, from anus	25.7	
Tibia	19.2	
Skull:		
Basal length .....	..	15.1
Extreme width of brain-case .....	..	9.1
Zygomatic width .....	..	9
Maxillar width across outer margins of m^3 ..	..	6.2

	♂ ad., type. mm.	♂ ad., typical locality. mm.
Skull (<i>con.</i>):		
Orbital constriction	2.4
Palatal bridge	2.7
Med. post. point of palate to front of pre- maxilla	6
Med. post. point of palate to for. magnum..	..	9.1
Mandible: condyle to front of incisors	12.3
Teeth:		
Front of upper canine to back of m^3	7
Front of lower canine to back of m_3	7.5

BIBLIOGRAPHICAL NOTICE.

Smithsonian Institution: United States National Museum. Special Bulletin. American Hydroids.—Part II. *The Sertularidæ.* With 41 Plates. By CHARLES CLEVELAND NUTTING, Professor of Zoology, University of Iowa. Washington: Government Printing Office, 1904. Sm. fol. Pp. 151. Index, pp. 316-3.5.

THE first volume of this work included the Plumularidæ, which had been supposed to be a much larger family than the Sertularidæ, of which latter family only about 20 American species had been mentioned in any single work. But by bringing together the scattered literature and by the description of upwards of 30 new forms Prof. Nutting has been able to describe and in most cases to figure as many as 130 species in the present work. We are pleased to see that he has been largely assisted by contributions of specimens and literature by the authorities of the British Museum (for portions of a number of Allman's 'Challenger' types) and numerous co-workers in Europe and America.

The work commences with an essay (with good text-illustrations) on the Morphology of the Sertularidæ, which is considered to be zoologically a lower family than the Plumularidæ, and which has hitherto been somewhat neglected. The various classifications are then discussed, and tables of genera and of the geographical distribution of the species are given. Then follows the systematic portion of the work, with full descriptions of the genera and species, the latter being tabulated under each genus and afterwards dealt with under the heads of Synonymy, Trophosome, Gonosome, Distribution, and Remarks. The collection in which the type is contained is also frequently indicated. The work concludes with an annotated Bibliography, a list of works to which reference is made in the synonymy in the systematic part of this work, but which have not been consulted by the author, and the explanation of plates, preceding the plates themselves. It forms a handsome volume, and appears to be an excellent piece of work.